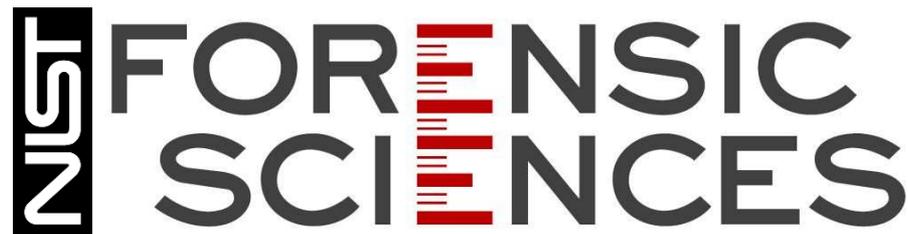


Florida International University Forensic Science Symposium
Miami, FL - April 30, 2014

NCFS, OSAC, and NIST: *More Acronyms and Action from the U.S. Government in Forensic Science*

John M. Butler, Ph.D.

National Institute of Standards and Technology



Background Information on NIST

- Started in 1901 with roots back to the Constitution
- Name changed to **National Institute of Standards and Technology (NIST)** from National Bureau of Standards in 1988
- Primary campus in Gaithersburg, Maryland (just outside of Washington, D.C.)
- Part of the U.S. Department of Commerce
- >3,000 employees and >2,000 associates
- Supply >1300 reference materials
- Defines official time for the U.S.



NIST: A Premier Scientific Institution

A world-leading measurement science and standards program

- Work resulting in 4 + 1 Nobel Prizes since 1997
- Kyoto Prize winner in 2011
- MacArthur Fellowship winners in 2003 and 2013
- National Medal of Science winners in 1998 and 2007
- ~ 10 National Academy Members
- ~120 National Society Fellows
- ~60 National/International Awards/year



Debbie Jin
2003 MacArthur
Genius Grant
2013 L'Oreal/UNESCO
"For Women in
Science" award



Dan Shechtman
2011 Nobel Prize
in Chemistry
based on work while
Visiting Scientist at NIST



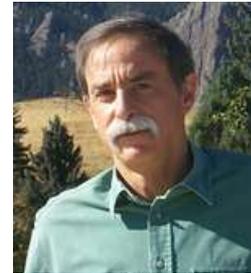
Bill Phillips
1997 Nobel Prize
in Physics



Eric Cornell
2001 Nobel Prize
in Physics



John Hall
2005 Nobel Prize
in Physics



David Wineland
2007 National Medal of Science
2012 Nobel Prize



John Cahn
1997 National Medal of
Science and 2011 Kyoto Prize
in Materials Science

U.S. Innovation Agenda – NIST has an increasing role



Examples of NIST Programs Addressing National Priorities:

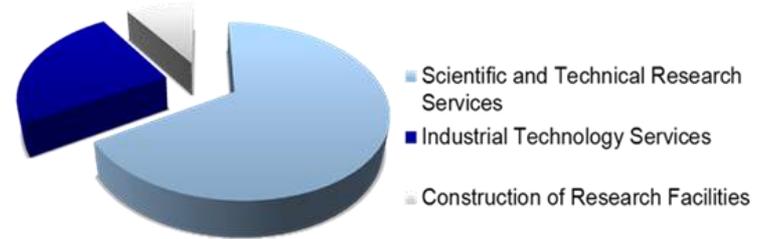
- Advanced Communications
- Advanced Manufacturing
- Climate Assessment
- Cybersecurity
- Energy
- **Forensic Science**
- Healthcare
- Nanotechnology

NIST-at-a-Glance

Major Assets are People

- ~ **3,000 Employees**; 1800 Scientists and Engineers
- ~ **2,800 Associates** and Facilities Users
- ~ 400 NIST Staff on ~1,000 national and international standards committees

NIST FY 2013 Congressional Appropriations \$763M



Plus

- ~ **\$120 M** from other Government Agencies
- ~ **\$50 M** for other reimbursable services

NIST has two main campuses.....



Gaithersburg, MD
62 buildings; 578 acres



Boulder, CO
26 buildings; 208 acres

+ two sites housing NIST radio stations:

- Ft. Collins; 390 acres
- Kauai; US Navy 30 acre site

and six joint institutes

- JILA – *atomic, molecular, and optical physics*
- JQI – *quantum science*
- IBBR – *biotech – adv. therapeutics*
- HML – *marine bioscience*
- NCCoE – *cyber security*
- CHMaD – *“materials by design”*

NIST Early History in Forensic Science Research

- 1913 - Wilmer Souder was asked to calibrate some precision measuring devices sent to him by famed handwriting expert Albert Osborn
- By the 1930s – Souder was recognized as a pioneer researcher in questioned documents, handwriting, typewriting, ballistics, and firearms
- Was instrumental in setting up the FBI Technical Laboratory in 1932



Forensics at NIST

**NIST has a long and rich history of work
in support of law enforcement**

Currently providing research and measurement services such as validated test methods, Standard Reference Materials, and Reference Data in areas such as:

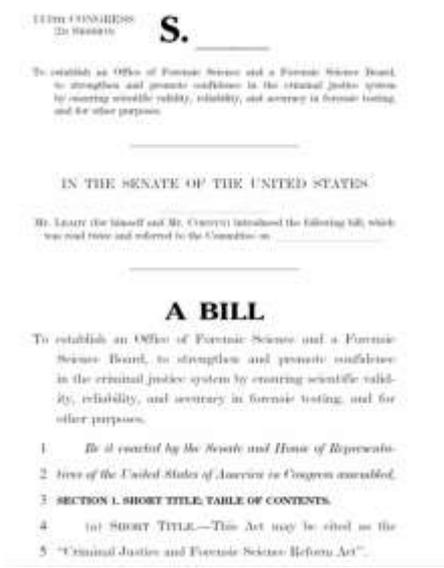
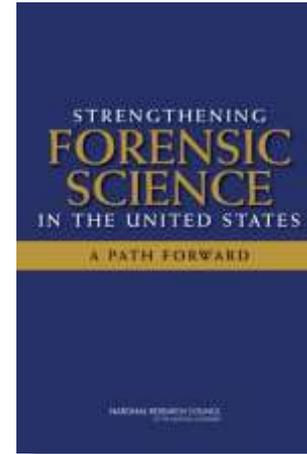
- crime scene investigations
- computer forensics
- fire investigations
- drug detection
- drunk driving testing
- biometrics (fingerprints and handwriting analysis)
- firearms/ballistics
- standards for body armor, nonlethal weapons
- explosives detection technologies
- sports integrity/fairness
- genetics and DNA-based identification



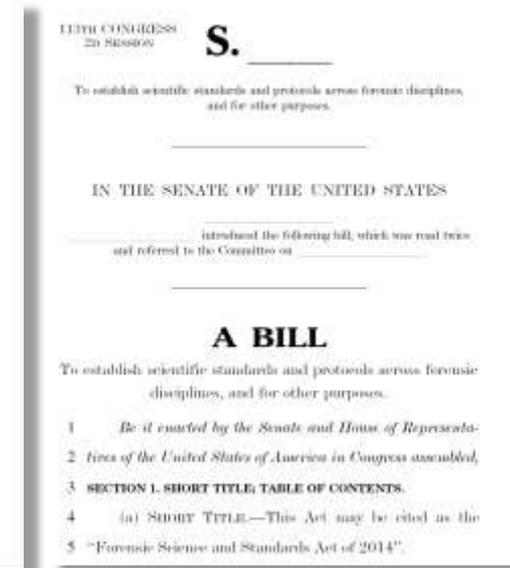
Support the Departments of Defense, Justice, and Homeland Security
in carrying out their programs

Forensic Science – Under the Microscope

- NAS report – Feb 2009
- White House Subcommittee on Forensic Science (SoFS) – July 2009 to Dec 2012
- **DOJ/NIST MOU – Mar 2013**
 - **NCFS** (National Commission on Forensic Science)
 - **OSAC** (Organization of Scientific Area Committees)
- Pending Legislation (Senate)
 - Leahy Bill (Justice)
 - Rockefeller Bill (Commerce)
- FY14 NIST Budget
 - +\$3M from DOJ to administer OSAC



Criminal Justice and Forensic Science Reform Act (Leahy Bill)



Forensic Science and Standards Act (Rockefeller Bill)

NIST and Other Federal Efforts in Forensic Science

- NIST-DOJ Partnership
 - MOU signed March 2013 by NIST Director and Attorney General
 - Formed National Commission on Forensic Science (NCFS) and guidance groups → Organization of Scientific Area Committees (OSAC)
- White House Office of Science & Technology Policy (OSTP)
 - National Science & Technology Council Subcommittee on Forensic Science (NSTC SoFS) operated from July 2009 to Dec 2012
 - White papers to be released soon
 - OSTP research working group with NSF, NIST, and DOJ meeting since Sept 2013

National Commission on Forensic Science

A Federal Advisory Committee
for the U.S. Department of Justice



What is a Federal Advisory Committee?

The Federal Advisory Committee Act of 1972 and its amendments provide strict rules including:

- Meeting notices are posted in the Federal Register prior to each meeting
- Meeting are open to the public
- Public comments are encouraged and accepted
- Meeting minutes and other relevant documents are available online at <http://www.facadatabase.gov/> (Committee 83353)

National Commission on Forensic Science (NCFS)

- **Purpose:** to create impactful policy recommendations to improve forensic science
- **Membership:** 37 commissioners from 21 states covering broad range of stakeholders
- **Leadership:** co-chaired by DOJ and NIST
- **Meetings:** quarterly, open to public (& webcast)
- **Subcommittees:** six formed initially
- **Website:** www.justice.gov/ncfs (as of May 2014)

Materials from the first NCFS meeting are available:

<http://www.facadatabase.gov/committee/meetingdocuments.aspx?flr=112006&cid=2461>

February 3-4, 2014 was the first meeting of the **National Commission on Forensic Science**



*First meeting was
not webcast but
future ones will be*

37 Commissioners + DOJ/NIST Leadership Team (with ~100 public attendees)

Duties of the National Commission on Forensic Science (NCFS) per its Charter

Duties include:

1. To recommend priorities for standards development to the Attorney General;
2. To review and recommend that the Attorney General endorse guidance identified or developed by subject-matter experts;
3. To develop proposed guidance concerning the intersection of forensic science and the courtroom;
4. To develop policy recommendations, including a uniform code of professional responsibility and minimum requirements for training, accreditation and/or certification;
5. To consider the recommendations of the National Science and Technology Council's Subcommittee on Forensic Science;
6. To identify and assess the current and future needs of the forensic sciences to strengthen their disciplines and meet growing demands.

Commission Leadership and Support

DOJ
Co-Chair



James M. Cole

Deputy Attorney General

NIST
Co-Chair



Patrick D. Gallagher

NIST Director & Acting, Deputy
Secretary of Commerce

DOJ
Vice-Chair

Nelson Santos

Deputy Assistant Administrator
for the Office of Forensic Sciences
at the Drug Enforcement Administration

NIST
Vice-Chair

John M. Butler

NIST Fellow &
Special Assistant to the Director
for Forensic Science

Brette Steele

Designated Federal Official

Robin Jones

Program Manager

NCFS Membership

- **37 commissioners and ex-officio members**
 - Selected from >300 applicants
 - Represent diverse backgrounds, extensive experience, and come **from 21 states**
- Professors of biochemistry, chemistry, pathology, physics, sociology, statistics, and law (including a Nobel laureate and National Medal of Science recipient)
- Crime laboratory directors
- Judges, prosecutors, and defense attorneys
- Sheriff, detective, coroner, medical examiner, victims' advocate, and defendants' rights advocate

NCFS Commissioners & *Ex-Officio* Members

Vice-Chairs: John M. Butler, Ph.D. (NIST) and Nelson A. Santos (DOJ)

Suzanne Bell, Ph.D.
Frederick Bieber, Ph.D.
Thomas Cech, Ph.D.
Cecelia Crouse, Ph.D.
Gregory Czarnopys
M. Bonner Denton, Ph.D.
Vincent DiMaio, M.D.
Troy Duster, Ph.D.
Jules Epstein
Stephen Fienberg, Ph.D.
Andrea Ferreira-Gonzalez, Ph.D.
John Fudenberg
S. James Gates, Jr., Ph.D.
Dean Gialamas
Paul Giannelli
Susan Howley
Hon. Barbara Hervey
Ted Hunt
Linda Jackson

John Kacavas
Pamela King
Mark LeBeau, Ph.D.
Julia Leighton
Hon. Bridget McCormack
Peter Neufeld
Phil Pulaski
Matthew Redle
J. Michael Salyards, Ph.D.
Sheriff Ryant Washington

Ex-officio (non-voting)
David Honey, Ph.D.
Marilyn Heustis, Ph.D.
Gerald LaPorte
Patricia Manzolillo
Hon. Jed Rakoff
Frances Schrotter
Kathryn Turman
Mark Weiss, Ph.D.

Members of the National Commission on Forensic Science (NCFS)

Suzanne	Bell	Professor of Chemistry
Frederick	Bieber	Professor of Pathology
Thomas	Cech	Professor of Biochemistry
M. Bonner	Denton	Professor of Chemistry and Geosciences
Andrea	Ferreira-Gonzalez	Professor of Pathology
Stephen	Fienberg	Professor of Statistics and Social Science
James	Gates, Jr.	Professor of Physics
Troy	Duster	Professor of Sociology
Jules	Epstein	Professor of Law
Paul	Giannelli	Professor of Law

Cecelia	Crouse	Palm Beach County Sheriff's Office Crime Laboratory
Dean	Gialamas	Los Angeles County Sheriff's Department
Linda	Jackson	Virginia Department of Forensic Science
John	Fudenberg	Clark County Office of the Coroner/Medical Examiner
Ryant	Washington	Fluvanna County Sheriff's Office
Phil	Pulaski	New York City Police Department

Nelson	Santos	Drug Enforcement Administration (DEA) Laboratory
Greg	Czarnopys	Alcohol, Tobacco, Firearms and Explosives (ATF) Lab
Gerry	LaPorte	Office of Investigative and Forensic Sciences, NIJ
Marc	LeBeau	Federal Bureau of Investigation (FBI) Laboratory
Kathryn	Turman	Office of Victim Assistance, Federal Bureau of Investigation

Members of the National Commission on Forensic Science (NCFS)

Ted	Hunt	Prosecuting Attorney
John	Kacavas	Prosecuting Attorney
Matt	Redle	Prosecuting Attorney

Pam	King	Public Defender
Julia	Leighton	Public Defender

Barbara	Hervey	Judge
Bridget Mary	McCormack	Judge
Jed	Rakoff	Judge

John	Butler	National Institute of Standards and Technology
David	Honey	National Intelligence for Science and Technology
Marilyn	Huestis	Chemistry and Drug Metabolism, NIDA, NIH
Patricia	Manzolillo	United States Postal Inspection Service
Jeff	Salyards	Department of Defense
Mark	Weiss	National Science Foundation

Vincent	Di Maio	Consultant in Forensic Pathology
Susan	Howley	National Center for Victims of Crime
Peter	Neufeld	Innocence Project
Fran	Schrotter	American National Standards Institute

MEETING ONE: February 3-4, 2014

Open to public (~100 public attendees)

Welcoming remarks by Co-Chairs and John Holdren,
Assistant to the President for Science and Technology

AGENDA ITEMS:

- Judge Harry Edwards reflections on the NAS report
- BJS Census of Publicly Funded Crime Laboratories
- White House Subcommittee on Forensic Science
- Organization of Scientific Area Committees (NIST)
- NCFS priority topics and establishment of subcommittees

Materials from the first NCFS meeting are available:

<http://www.facadatabase.gov/committee/meetingdocuments.aspx?flr=112006&cid=2461>

NCFS Co-Chairs and OSTP Director address the first Commission meeting

NIST Director
Pat Gallagher

Deputy Attorney General
James Cole

OSTP Director
John Holdren



Judge Harry T. Edwards (co-chair of the 2009 NAS Report) addresses the National Commission on Forensic Science at its first meeting on February 3, 2014





Informational Briefings

- **Judge Harry Edwards** spoke on findings from the 2009 NAS report
- Bureau of Justice Statistics researcher **Matt DuRose** reviewed the 2009 census of U.S. forensic laboratories



White House Subcommittee on Forensic Science committee chairs discuss outcome of work conducted from 2009 to 2012

Patricia Manzolillo

U.S. Postal Service
Forensic Laboratory



**Accreditation
& Certification**

Dean Gialamas

LA County Sheriff's
Office Crime Lab



**Proficiency
Testing**

Jeff Salyards

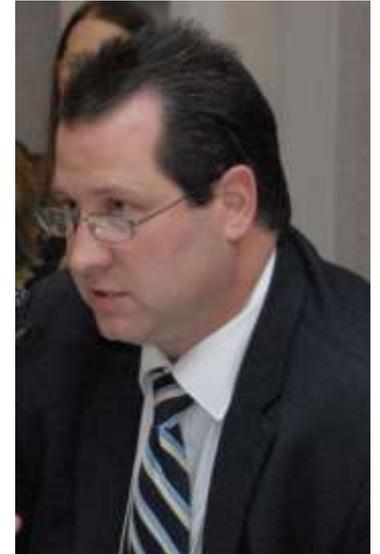
Defense Forensic
Science Center



**Research &
Development**

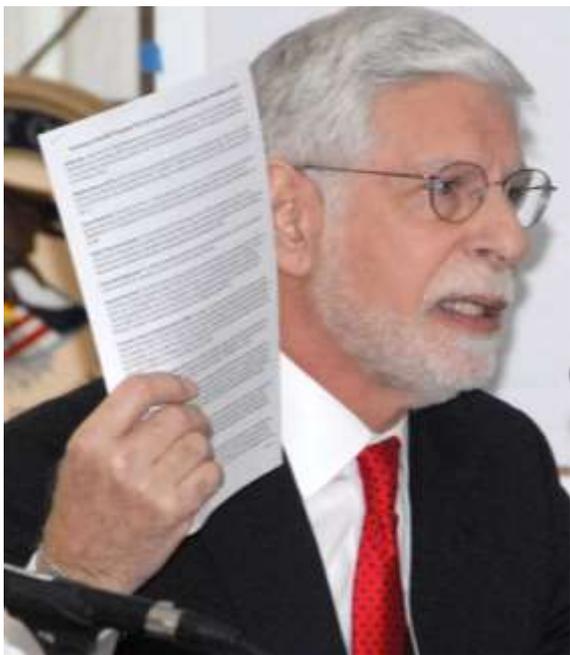
Gerry LaPorte

National Institute
of Justice



**Documentary
Standards**

Mark Stolorow (NIST) introduces the Organization of Scientific Area Committees (OSAC) plan



For more information, see <http://www.nist.gov/forensics/osac.cfm>

Commission discussions were led by Vice-Chairs John Butler (NIST) and Nelson Santos (DOJ)



MEETING TWO: May 12 – 13, 2014

Open to public and webcast

Meeting 3: August 26-27, 2014
Meeting 4: October 28-29, 2014

AGENDA ITEMS:

- Ethics, Human Factors and Cognitive Bias in Forensic Science
- OSAC Update/Report
- Subcommittee Reports

Those interested in attending the meeting in person must register online at <http://conferences.csrincorporated.com> using conference code: 2014-107P no later than 5:00 p.m. (EST) May 5, 2014.

See <https://www.federalregister.gov/articles/2014/04/22/2014-09101/notice-of-federal-advisory-committee-meeting>

6 Initial NCFS Subcommittees

1. Accreditation and Proficiency Testing
2. Interim Solutions
3. Medico-legal Death Investigation
4. Reporting and Testimony
5. Scientific Inquiry and Research
6. Training on Science and Law

NCFS SUBCOMMITTEE

Accreditation and Proficiency Testing

Co-Chairs:

- ***Linda Jackson***, Director, Virginia Department of Forensic Science
- ***Patricia Manzolillo***, Director, U.S. Postal Service Forensic Laboratory

ISSUES:

- Role of accreditation and proficiency test programs in quality managing systems
- Standards for accreditation and proficiency testing
- Technological innovations
- Implementation challenges

NCFS SUBCOMMITTEE

Interim Solutions

Co-Chairs:

- ***Dean Gialamas***, *Crime Laboratory Director, Los Angeles County Sheriff's Office Scientific Services Bureau*
- ***Peter Neufeld***, *Co-Director, Innocence Project*

ISSUES:

- Reporting requirements
- Root cause analysis
- Terminology
- Expressing limitations of results

NCFS SUBCOMMITTEE

Medicolegal Death Investigation

Co-Chairs:

- ***John Fudenberg***, Assistant Coroner, Clark County Office of the Coroner/Medical Examiner
- ***Dr. Vincent Di Maio***, Consultant in Forensic Pathology

ISSUES:

- Accreditation
- Certification
- Education and training requirements
- Mass fatality management/disaster victim identification
- Missing persons/unidentified dead

NCFS SUBCOMMITTEE

Reporting and Testimony

Co-Chairs:

- ***The Hon. Jed Rakoff, U.S. District Court, Southern District of New York***
- ***Matt Redle, Sheridan County (WY) Prosecuting Attorney's Office***

ISSUES:

- Uniformity in reporting
- Components of a forensic report
- Terminology
- Characterization of results

NCFS SUBCOMMITTEE

Scientific Inquiry and Research

Co-Chairs:

- ***Dr. Suzanne Bell***, Associate Professor of Chemistry, West Virginia University
- ***Dr. Jeff Salyards***, Director, Defense Forensic Science Center

ISSUES:

- Foundational research supporting forensics
- Fragmentation of research programs
- Advanced technologies
- Physical vs. social science research in forensics

NCFS SUBCOMMITTEE

Training on Science and Law

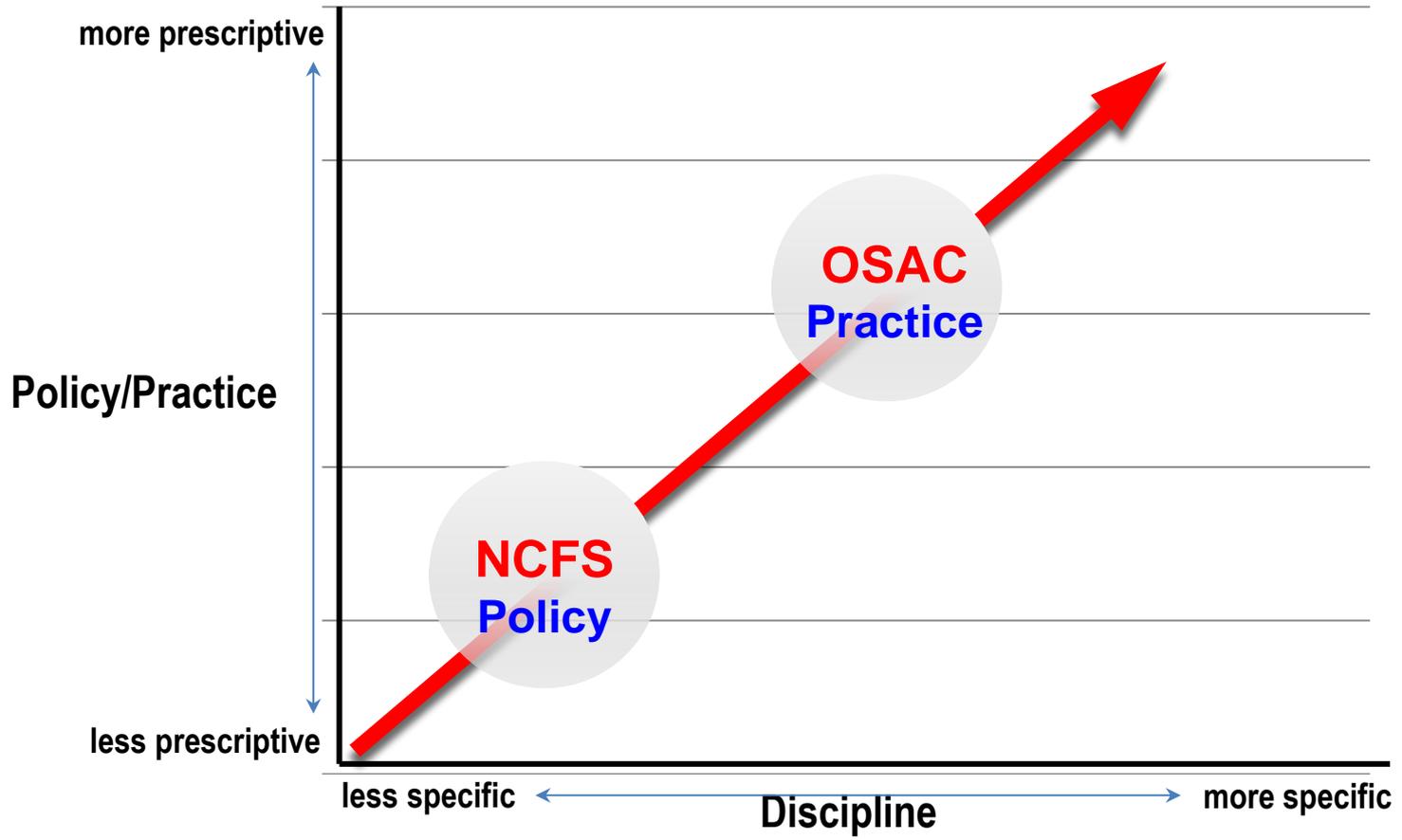
Co-Chairs:

- ***Dr. Jim Gates***, *Professor of Physics, University of Maryland*
- ***The Hon. Barbara Hervey***, *Texas Court of Criminal Appeals*

ISSUES:

- Uniform programs for educating lawyers and judges on forensic science
- Uniform programs for educating forensic scientists on legal issues
- Collaborative training environments

NCFS & OSAC General Relationship



NCFS CONTACT INFORMATION

Nelson.A.Santos@usdoj.gov

John.Butler@nist.gov

Brette.L.Steele@usdoj.gov

Robin.W.Jones@usdoj.gov



Organization of Scientific Area Committees (OSAC)

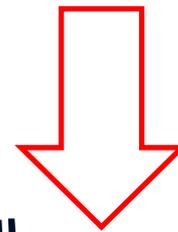
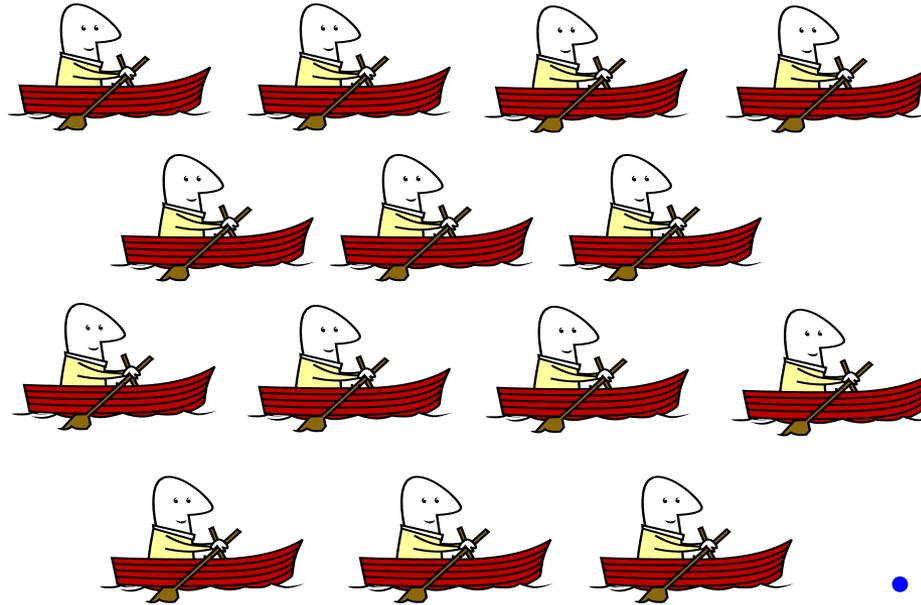
Forensic discipline-specific guidance
groups administered by NIST



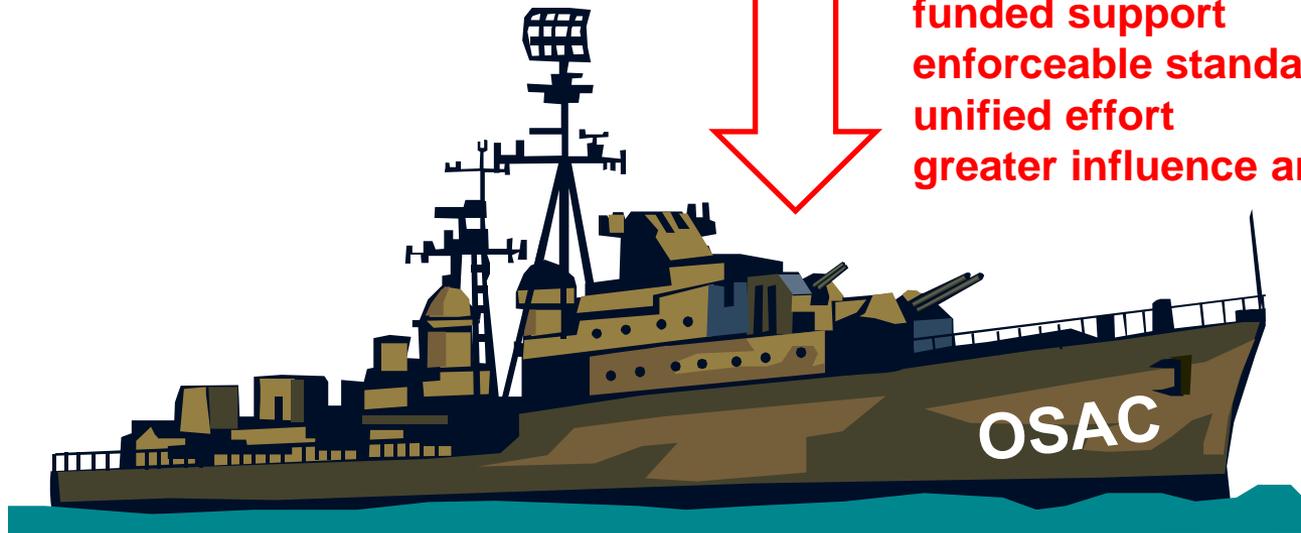
Scientific Working Groups (SWGs)

- Some forensic disciplines had their own scientific working groups, while others did not
- Some received travel support for their work, some did not
- Very little sharing of best practices between SWGs, and very few common resources
- Documents that were developed were of variable quality and did not share common definitions
- Inconsistent training, standards, protocols,

Individual SWGs vs. Organized Effort



**funded support
enforceable standards
unified effort
greater influence and impact**



Department of Justice

Policy focused

Limited Term (FACA)

Attorney General

Recommendations

National Commission
on Forensic Science
(NCFS)

NIST

Practice focused

Ongoing (Forensic Science
Quality Infrastructure)

Organization of
Scientific Area
Committees (OSAC)

Forensic Science
Standards Board
(FSSB)

Outputs

Forensic Science
Code of Practice

Process &
technical merit

FSSB
Registry of
Approved
Standards

Technical merit

List of SAC
Approved
Best
Practices
and
Guidelines

Accreditors
Appropriate ISO/IEC
documents, e.g. 17011

Laboratories
Appropriate ISO/IEC documents
and discipline-specific approved
standards and documents

Organization of Scientific Area Committees (OSAC)

<http://www.nist.gov/forensics/osac.cfm>

- Formerly called “guidance groups” to replace SWGs
- Information collected and shared
 - SWG chairs (June 18, 2013)
 - Notice of Inquiry (Sept 27 to Nov 26, 2013)
 - NCFS (Feb 4, 2014)
 - AAFS and webcast (Feb 18, 2014)
- **Membership applications now being accepted**
- OSAC membership to be selected during Spring/Summer 2014

Notice of Inquiry (NOI) Responses Received

- **82 responses received**

- 12 SWGs commented
- 15 other groups including ASCLD, CAC, CFSO, IAI, Innocence Project, NACDL
- More than a dozen labs and a half dozen companies
- Individuals from 21 states and four countries (UK, Canada, Germany, and Australia)

In general, the responses support the proposed structure offered in the next slide.

- **Public posting of comments on [NIST.gov/forensics](https://www.nist.gov/forensics)**

- **Highlights:**

- *Practitioner voice should be a major player*
- *Strongly urged to include all forensic science disciplines*
- *Concern about funding (no “pay-to-play” fees)*
- *Interest in consistent and open support for web postings*
- *Interest in face-to-face and virtual meetings*
- *Encouragement to include existing professional organizations*

Organization of Scientific Area Committees (OSAC)

Forensic Science Standards Board (FSSB)

Legal Resource
Committee (LRC)

Quality Infrastructure
Committee (QIC)

Human Factors
Committee (HFC)

SAC
Biology/DNA

SAC
Chemistry/
Instrumental Analysis

SAC
Crime Scene/
Death Investigation

SAC
IT/Multimedia

SAC
Physics/Pattern

DNA Analysis Sub1

DNA Analysis Sub2

Wildlife Forensics Sub

Controlled Substances Sub

Fire Debris and Explosives
Sub (lab)

Geological Materials Sub

Gunshot Residue Sub

Materials (Trace) Sub

Toxicology Sub

Anthropology Sub

Disaster Victim
Identification Sub

Dogs and Sensors Sub

Fire Scene and
Explosives Sub

Medical/Legal Death
Investigation Sub

Odontology Sub

Facial Identification Sub

Imaging Technologies Sub

Speaker Recognition Sub

Blood Stain Pattern
Analysis Sub

Friction Ridge Sub

Firearms & Toolmarks
Sub

Footwear
& Tire Tread Sub

Questioned Documents
Sub

SAC = Scientific Area Committee
Sub = Subcommittee

March 18, 2014

OSAC Support

Forensic Science Standards Board (FSSB)

```
graph TD; FSSB[Forensic Science Standards Board (FSSB)] --> LRC[Legal Resource Committee (LRC)]; FSSB --> QIC[Quality Infrastructure Committee (QIC)]; FSSB --> HFC[Human Factors Committee (HFC)];
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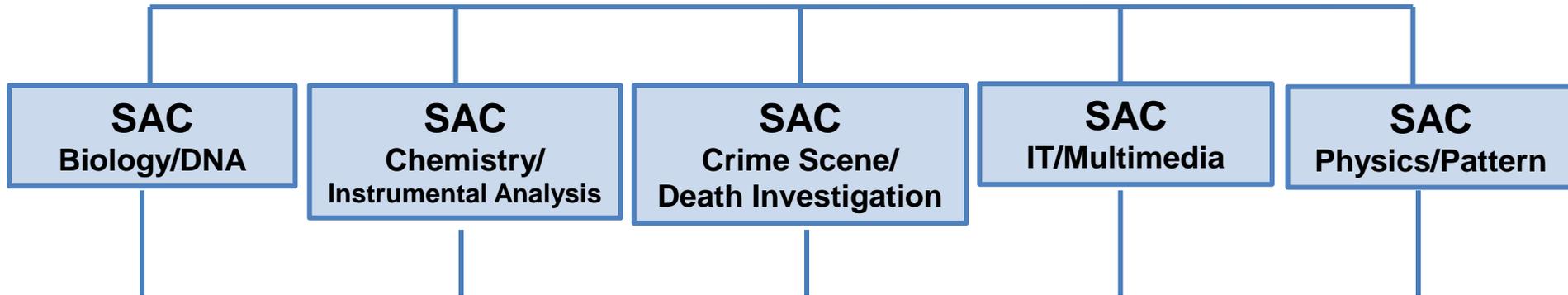
Legal Resource
Committee (**LRC**)

Quality Infrastructure
Committee (**QIC**)

Human Factors
Committee (**HFC**)

- **LRC** composed of up to 10 judges, lawyers, and legal experts who **provide guidance about the legal ramifications** of forensic standards under development and input on presentation of forensic results to the legal system
- **QIC** composed of up to 15 standards experts, quality systems managers, laboratory managers, and accreditation and certification specialists who are **responsible for writing and updating the Forensic Science Code of Practice**
- **HFC** composed of up to 10 psychologists, quality systems managers, and usability experts who **provide guidance on the influence of systems design on human performance and on ways to mitigate errors in complex tasks**

Scientific Area Committees (SACs)



- **Sets priorities for subcommittee work** and enables a bigger picture view on topics like report wording and statistical analysis
- Recommends (to FSSB) creating, merging, or abolishing subcommittees
- **SAC meetings will be open to the public** and agendas made available prior to meetings

SAC Membership

Each SAC is comprised of up to 15 members including

- Subcommittee chairs
- Representatives of professional forensic science organizations appropriate to the scientific area (e.g., AAFS, AFTE, IAI, NAME, and SOFT)
- Researchers
- Measurement scientists (including statisticians, epidemiologists, etc.)

SAC Subcommittees

DNA Analysis Sub1

Controlled Substances Sub

Anthropology Sub

Facial Identification Sub

Blood Stain Pattern
Analysis Sub

DNA Analysis Sub2

Fire Debris and Explosives
Sub (lab)

Disaster Victim
Identification Sub

Imaging Technologies Sub

Friction Ridge Sub

Wildlife Forensics Sub

Geological Materials Sub

Dogs and Sensors Sub

Speaker Recognition Sub

Firearms & Toolmarks
Sub

Gunshot Residue Sub

Fire Scene and
Explosives Sub

Footwear
& Tire Tread Sub

Materials (Trace) Sub

Medical/Legal Death
Investigation Sub

Questioned Documents
Sub

Toxicology Sub

Odontology Sub

Where the real work will happen

Many aspects and participants may map to current SWGs

- **Develops and vets formal documents** to be submitted for approval by SAC (in case of guidelines) or SAC & FSSB (in case of standards)
- Communicates activities and progress to SACs
- Subcommittee **deliberations are not public**

Subcommittee Membership

Each subcommittee has a maximum **membership of 20 voting members** (and up to 5 invited guests per meeting)

- Distribution goal of
 - ~70% practitioner* (20% federal, 30% state & local, 20% civil or other),
 - 20% researchers (including statisticians, epidemiologists, etc.), and
 - 10% R&D technology partners and providers

**** Practitioner is defined as someone actively doing or managing casework***

Organization of Scientific Area Committees (OSAC)

Forensic Science Standards Board (FSSB)

Legal Resource
Committee (LRC)

Quality Infrastructure
Committee (QIC)

Human Factors
Committee (HFC)

SAC
Biology/DNA

SAC
Chemistry/
Instrumental Analysis

SAC
Crime Scene/
Death Investigation

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DNA Analysis Sub1

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Toxicology Sub

Anthropology Sub

Disaster Victim
Identification Sub

Dogs and Sensors Sub

Fire Scene and
Explosives Sub

Medical/Legal Death
Investigation Sub

Odontology Sub

Facial Identification Sub

Imaging Technologies Sub

Speaker Recognition Sub

Blood Stain Pattern
Analysis Sub

Friction Ridge Sub

Firearms & Toolmarks
Sub

Footwear
& Tire Tread Sub

Questioned Documents
Sub

SAC = Scientific Area Committee
Sub = Subcommittee

March 18, 2014

OSAC Membership

- **Initial selection of FSSB, LRC, QIC, HFC and SACs will be by NIST-DOJ leadership/membership committee**
- SAC subcommittee members will be selected by FSSB and SACs (after review by NIST-DOJ committee)
 - FSSB will define term-limits and plan to apply uniformly
 - NIST scientists will participate as standards and coordination experts as appropriate in the FSSB, SACs, and subcommittees
- **Planned Timeline**
 - **Solicit applications and recruit potential OSAC members starting in April/May 2014**
 - Appoint FSSB and meet in June
 - Appoint LRC, QIC, HFC and SAC membership in July
 - Select subcommittee membership in August (with NIST-DOJ review)
 - Conduct OSAC training virtually over the summer via webinar
 - **Hold in-person meeting in November 2014**

OSAC Membership

- See OSAC website
 - <http://www.nist.gov/forensics/osacroles.cfm>
 - <https://www.nist.gov/forensics/osac-application.cfm>
- **Apply before May 11, 2014 11:59 PM Eastern**



OSAC will consist of a Forensic Science Standards Board, three resource committees, five scientific area committees and 23 subcommittees. **NIST needs between 500 and 600 subject matter experts representing a balance of experience and perspectives to serve on OSAC.** An OSAC term will be three years, although the initial appointees will serve terms of two, three or four years so that subsequent members are appointed on a staggered basis.

NIST Research in Forensic Science



NIST Forensic Science Research Efforts

Assisting the forensic science community through:

- Scientific and technical advances
- New analytical tools and supporting infrastructure
- Scientific validation of currently applied instrumentation and methods
- Evaluation of models, methods, and standards
- Performance and validation studies to define and estimate error rates

NIST Forensic Science Program

- Focus for internal NIST research funds are currently in four areas:
 - **DNA**
 - Digital evidence
 - Ballistics
 - Statistics

The Future of Forensic DNA

is Similar to the Olympic Motto of
“Swifter, Higher, Stronger”



**Rapid
DNA**

**New Loci
& Assays**

**Mixture
Analysis**

**Expert
Systems**

**Next-gen
sequencing**

Resources

Training

Action

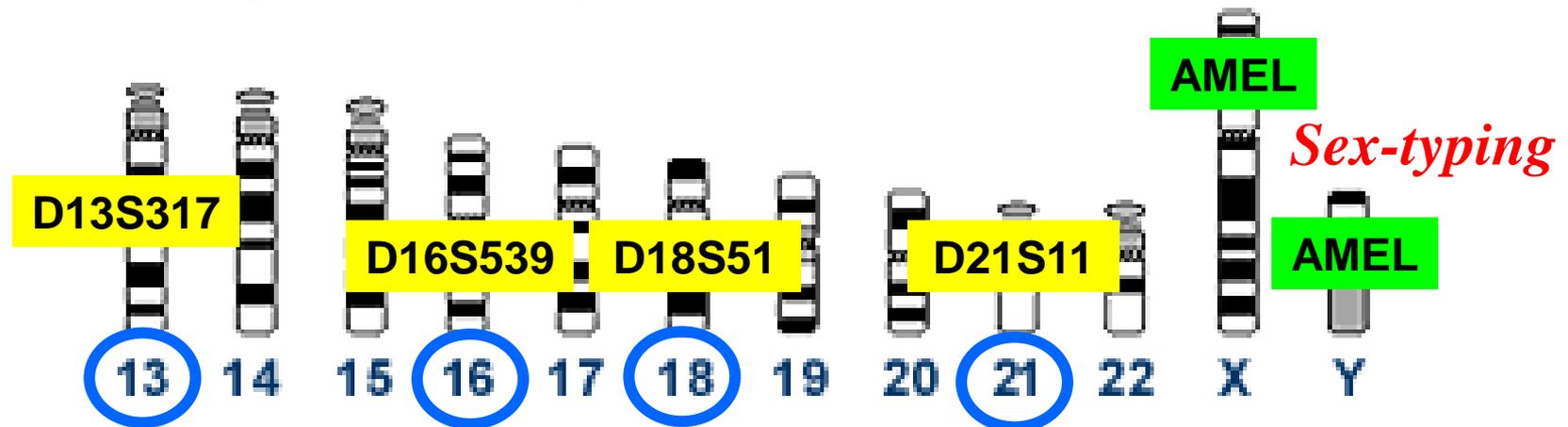
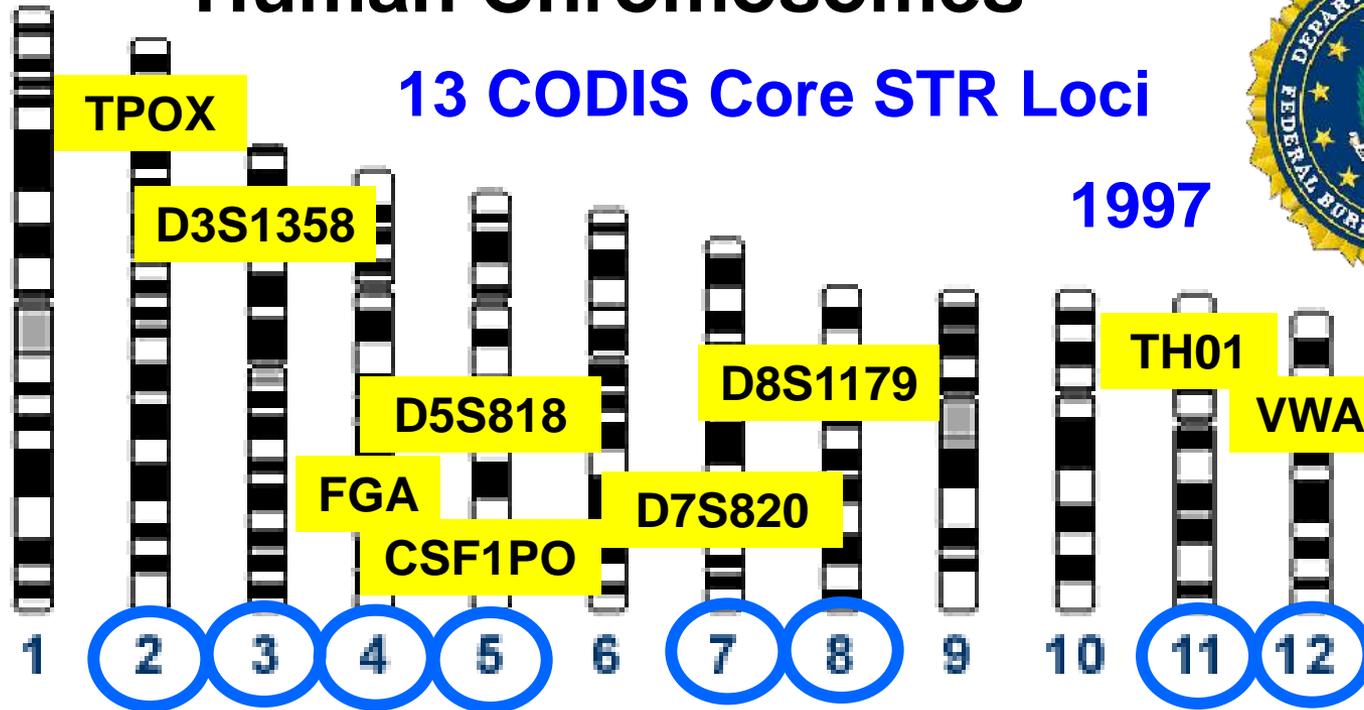
Position of Forensic STR Markers on Human Chromosomes

Core STR Loci for the United States



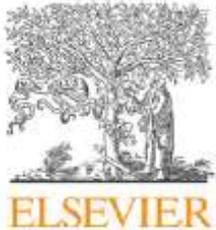
13 CODIS Core STR Loci

1997



Expanding the U.S. CODIS Core Loci

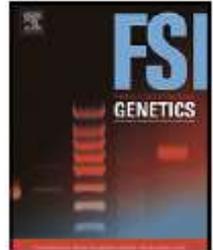
D.R. Hares (2012) Expanding the CODIS Core Loci in the United States. *Forensic Sci. Int. Genet.* 6(1): e52-e54
Addendum to expanding the CODIS core loci in the United States, *Forensic Sci. Int. Genet.* (2012) 6(5): e135



Contents lists available at ScienceDirect

Forensic Science International: Genetics

journal homepage: www.elsevier.com/locate/fsig



Letter to the Editor

Expanding the CODIS core loci in the United States

CODIS Core Loci Working Group

Formed in May 2010 to make recommendations
to FBI CODIS Unit

Douglas Hares (Chair) – FBI

John Butler – NIST

Cecelia Crouse – FL PBSO

Brad Jenkins – VA DFS

Ken Konzak – CA DOJ

Taylor Scott – IL SP

major reasons for expanding the CODIS core loci in the United States:

- (1) To reduce the likelihood of adventitious matches [7] as the number of profiles stored at NDIS continues to increase each year (expected to total over 10 million profiles by the time of this publication). There are no signs that this trend will slow down as States expand the coverage of their DNA database programs and increase laboratory efficiency and capacity.
- (2) To increase international compatibility to assist law enforcement data sharing efforts.
- (3) To increase discrimination power to aid missing persons cases.

Three major reasons for expanding the CODIS core loci in the United States

D.R. Hares (2012) *Forensic Sci. Int. Genet.* 6(1):e52-e54

- **To reduce the likelihood of adventitious matches** as the number of profiles stored at NDIS continues to increase each year
- **To increase international compatibility** to assist law enforcement data sharing efforts
- **To increase discrimination power to aid missing persons cases**

STR Marker Layouts for New U.S. Kits

100 bp

200 bp

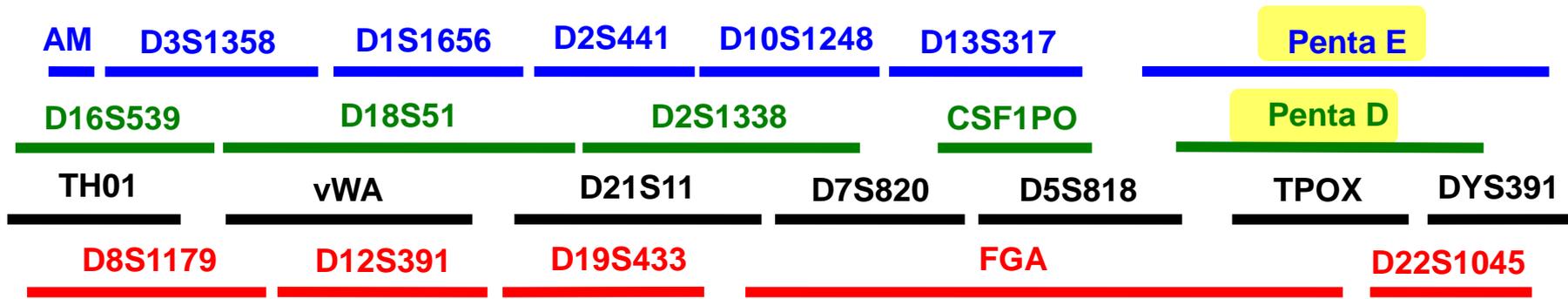
300 bp

400 bp

24plex
(5-dye)

2012

PowerPlex Fusion

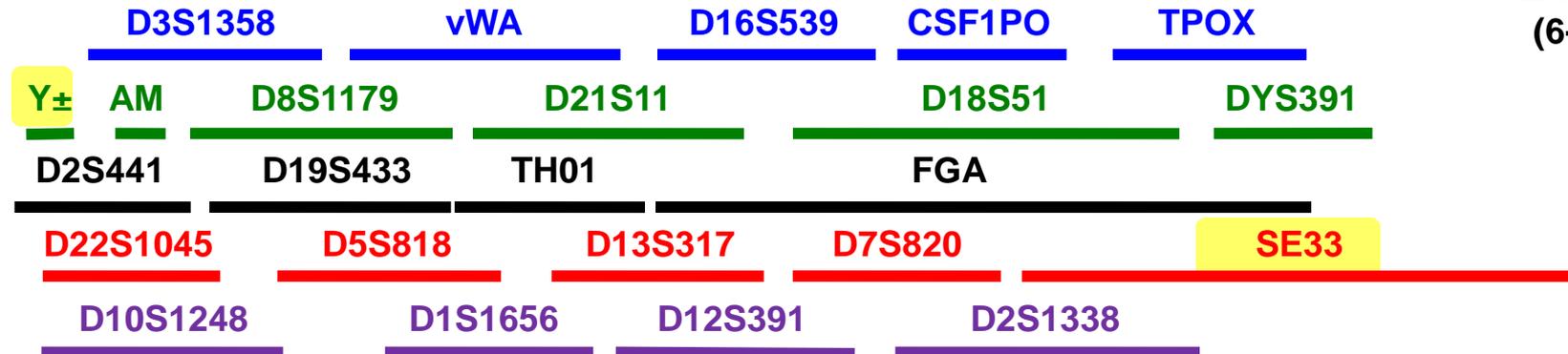


22 core and recommended loci + 2 additional loci

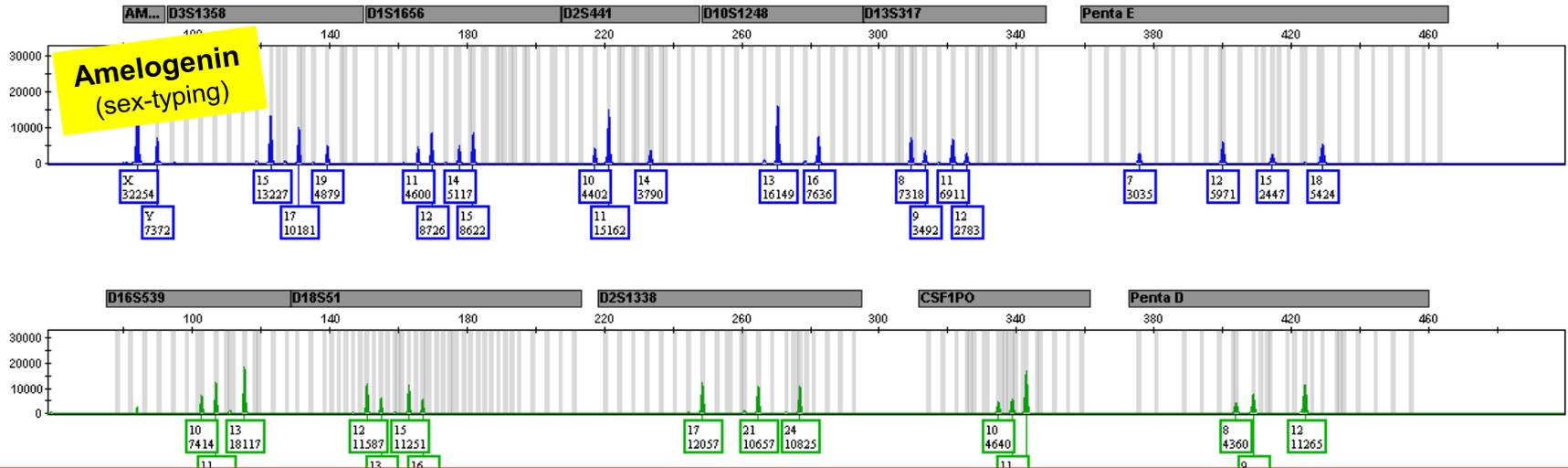
24plex
(6-dye)

2012

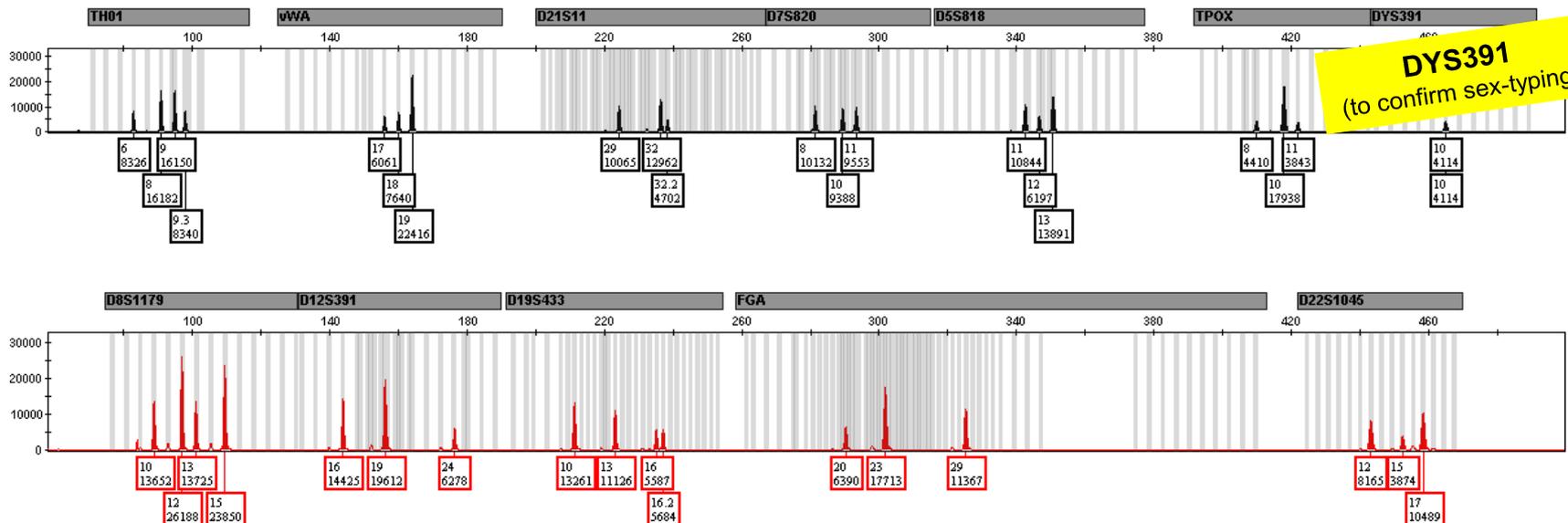
GlobalFiler



DNA Mixture Detected with PowerPlex Fusion (24plex STR kit)



22 autosomal STR loci need to be interpreted... (+50% over current 15 STRs)



Size standard not shown

Data courtesy of Becky Hill (NIST)

Rapid DNA

- IntegenX and NetBio/GE Health have instruments that can produce STR profiles in <90 minutes from swab to result
- Ted Hunt's (Kansas City prosecutor) talk at AAFS noted that speed brings other challenges and emphasized the need for better communication between detectives, crime scene investigators, prosecutors, and the laboratory

Next-Generation Sequencing (NGS)

- Illumina (MiSeq) and Life Technologies (PGM) enable massively parallel sequencing
- mtDNA genome sequencing can be performed
- STR allele sequencing enables internal sequence differences (sub-alleles) to be characterized
- Current work flows are more complicated, require more DNA, and **generate significantly more data**

Rapid DNA and NGS Research in the Applied Genetics Group at NIST

Peter Vallone, Erica Butts, Katherine Gettings, and Kevin Kiesler

Rapid DNA

- Testing the NetBio (ANDE/DNA Scan) and IntegenX (RapidHit 200) instruments
- Supporting the FBI R-DNA SWGDAM committee developing guidelines for the use of R-DNA instrumentation in labs
- Support developmental validation studies for both platforms



Next-Generation Sequencing

- NIST is using both the **Illumina MiSeq** and **Life Tech Ion Torrent PGM** NGS platforms
- Performing sequencing on mitochondrial SRMs 2392 and 2392-I
- Typing identity and ancestry SNPs on the PGM platform
- Starting work on STR typing of the MiSeq platform

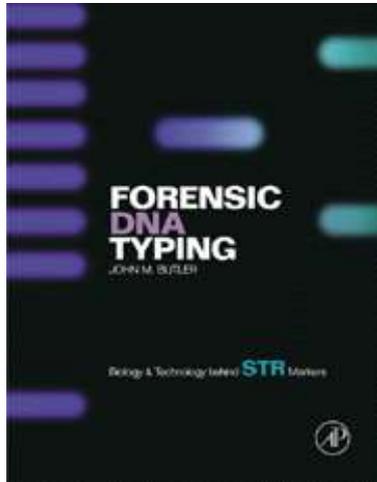


Forensic DNA Typing Textbooks Have Set the Standard for the Field

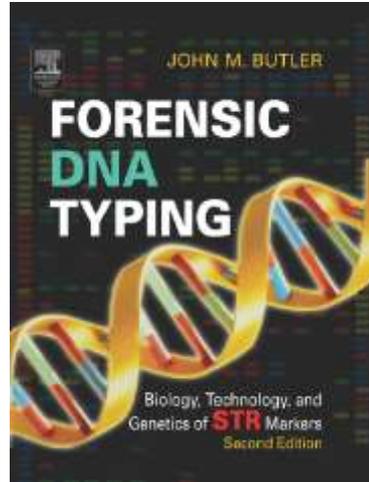
1st Edition

2nd Edition

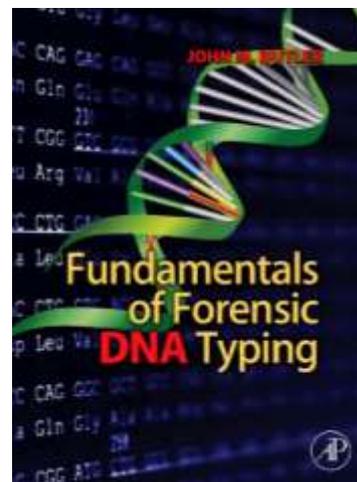
3rd Edition (3 volumes)



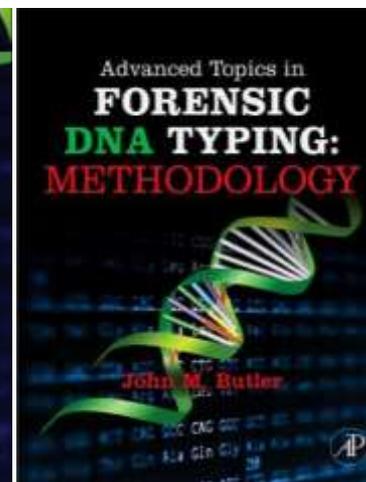
Jan 2001
335 pages



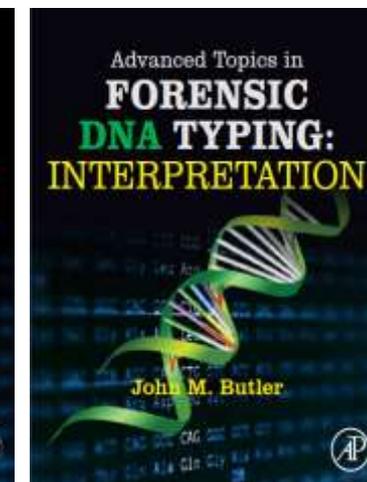
Feb 2005
688 pages



Sept 2009
520 pages



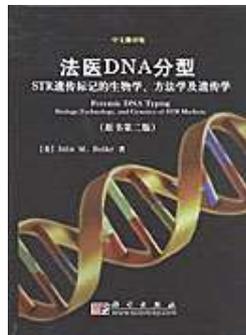
Aug 2011
704 pages



Sept 2014
~700 pages

Language Editions

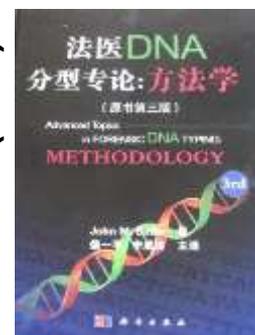
Chinese (2007)



Japanese (2009)



Chinese (2013)



Steps in Forensic DNA Testing

Gathering the Data

Understanding Results Obtained & Sharing Them

Collection/Storage/
Characterization

Extraction/
Quantitation

Amplification/
Marker Sets

Separation/
Detection

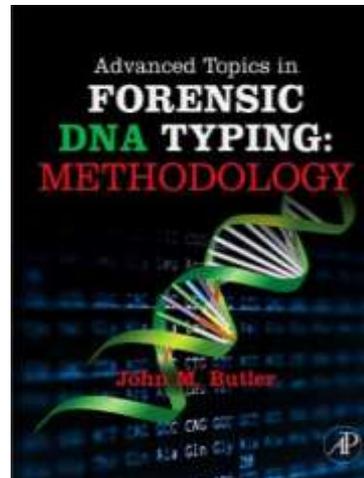
Data

Stats

Report

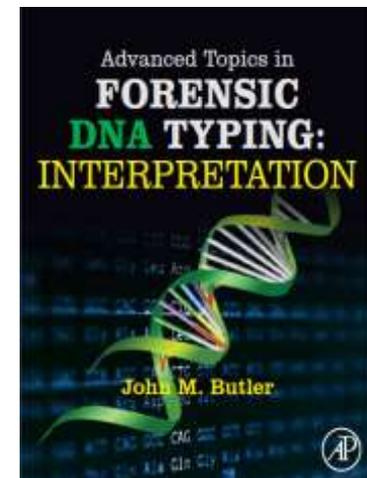
Interpretation

Advanced Topics: Methodology



August 2011

Advanced Topics: Interpretation



September 2014

Acknowledgments

Past and present funding from **National Institute of Justice** and the **FBI** to the Applied Genetics Group

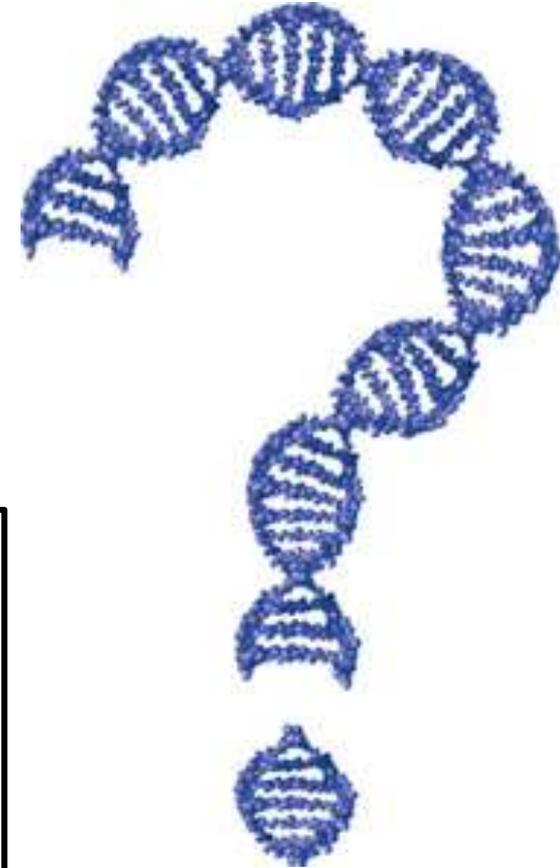
Slides and Discussions

- **NCFS:** Robin Jones, Nelson Santos, Brette Steele
- **OSAC:** Mark Stolorow, John Paul Jones
- **NIST Research:** Sue Ballou, Rich Cavanagh
- **Forensic DNA:** Pete Vallone, Mike Coble & Becky Hill (NIST Applied Genetics Group)
- SWGDAM Autosomal STR Interpretation Committee

Contact info:

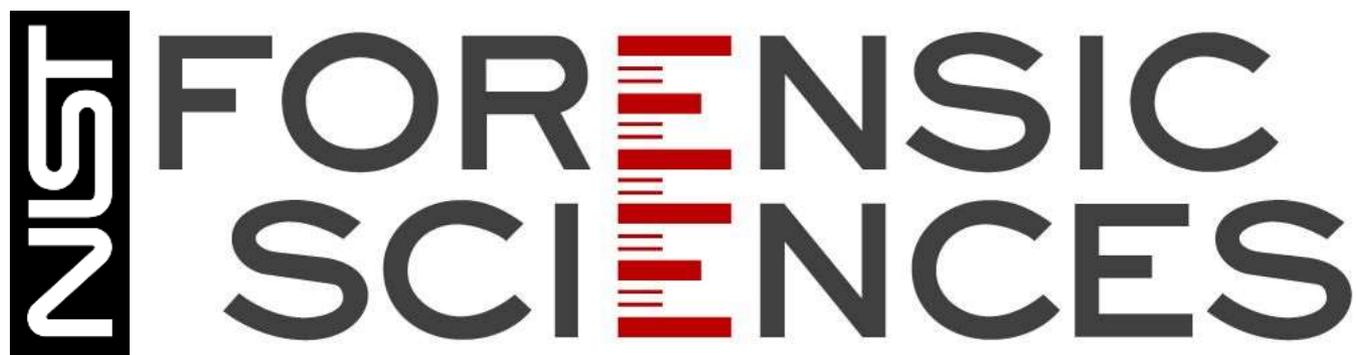
john.butler@nist.gov

301-975-4049



Thank you for your attention!

Materials from the first NCFS meeting are available:
[http://www.facadatabase.gov/committee/
meetingdocuments.aspx?flr=112006&cid=2461](http://www.facadatabase.gov/committee/meetingdocuments.aspx?flr=112006&cid=2461)



www.nist.gov/forensics